Maternal Characteristics and Nutritional Status among First Trimester Pregnant Women in West Sumatera

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Article Info

Abstract

Optimizing the health and nutritional status of mothers during pregnancy can reduce the risk of stunting, with prevalence among children under five, in which the undernutrition condition was still high. It was about 24.4%. The research objective is to determine the association between maternal characteristics with nutritional status in the first trimester. This cross-sectional study involved 52 pregnant women in the first trimester. This study was conducted in the working area of health centers in Padang City 2022 which had a high prevalence of undernutrition problems. Data analysis was carried out using univariate tests and bivariate tests using chi-square with 95% CI and a significance level of p-value < 0.05. The analysis results showed a significant relationship between BMI before pregnancy with nutritional status in the first trimester among pregnant women (p-value = 0.000). There is no relationship between education, occupation, age, and parity of the mother with nutritional status in the first trimester. Suggestions for pregnant women are to know their nutritional status, consume nutritious foods that are needed for fetal growth, and reduce the risk of low birth weight and stunting.

Introduction

Globally, the prevalence of Chronic Energy Deficiency (CED) among mothers is still high, especially in developing countries, such as Indonesia (Angraini, 2023). A national basic health survey in Indonesia on year 2018 identified that pregnant and not pregnant women's prevalence with CED was 17.3% and 14.5% respectively (Kemenkes RI, 2018). In addition, Indonesia's health data showed that mothers with undernutrition status during pregnancy are at increased risk of poor maternal and child health outcomes in later life. Based on data from the Indonesian toddler nutritional status survey in the year 2022, stunting prevalence among children under five which is one of the undernutrition conditions was still high, it was about 21.6% (Kemenkes RI, 2022).

Many factors contribute to the nutritional status of children, some of those factors are maternal nutritional status before and during pregnancy. Mothers who had normal pre-pregnancy Body Mass Index (BMI) means they had sufficient nutrients stored in their bodies to meet the infant's needs when mothers came into pregnancy. Then during pregnancy, mothers need increases according to meet the increased nutritional demands for the growth and development of the fetus and to take care of the mother's health (Jouanne *et al.*, 2021).

Previous studies in Ethiopia and China have shown that maternal inadequate gestational weight gain was positively related to increased risk of having a small baby, such as Low Birth Weight (LBW), small for gestational age, and risk of stunting (Li *et al.*, 2013; Woldeamanuel *et al.*, 2019). Also, a study in Malaysia found that a mother's BMI and gestational weight gain were determinants of LBW. Another study identified that mothers who had a pre-pregnancy BMI below 18.5 kg/m2 were associated with lower

birth weight of infants (Bonakdar, 2019). As we know that mother's nutritional status in the first trimester of pregnancy is also a crucial factor that has an association with fetal growth. At this time many metabolic and physiological functions are changed which also impact gestational weight gain and maternal health. Therefore, the objective of the study was to assess the characteristics of pregnant women and pre-pregnancy body mass index concerning nutritional status in the first trimester of pregnancy in West Sumatera Province, Indonesia.

Method

The study was conducted by a cross-sectional study among 52 pregnant women in the first trimester of pregnancy which collected the data from health centers. The participant of the study was recruited from 3 (three) health centers that had a high prevalence of undernutrition problems in Padang City, Indonesia. The inclusion criteria of the study were mothers who were in healthy condition, had no serious medical condition, such as a history of diabetes mellitus and cardiovascular diseases, and were able to communicate.

Information regarding socio-demographic characteristics, obstetric history, dietary intake, and anthropometric data were assessed through direct interviews and a standardized questionnaire. Maternal pre-pregnancy Body Mass Index (BMI) was collected from a maternal health book and maternal BMI in the first trimester of pregnancy was collected through direct assessment, measuring weight and height. BMI was calculated by weight in kilograms divided by the square of height in meters (kg/m^2). Weighing is carried out 1 time per month and each time weighing is carried out 2 times. The type of scales used is the GEA brand digital scales with a capacity of 5-150 kg and an accuracy of 50 grams. Next, measure the mother's arm circumference using Lila's tape measure. It is expected that Lila's mother is not more or less than the normal limit for pregnant women (≥ 23.5 cm), if it is less, it means that the mother is said to be CED and is not included in the expected respondent criteria.

Characteristic of pregnant women, such as age was categorized into age at risk, if the mother was under 20 years and more than 35 years. Then, no risk of age if the mother has an age range of 20-35 years. The mother's education level was categorized into low education, if the mother had education under middle high school, and high education if the mother had education more than senior high school. Mother's occupation was categorized into not working or as a housewife and working groups. Frequency of pregnancy was categorized into two groups, have less than 2 of pregnancy (≤ 2) and more than 2 (>2) of pregnancy. Maternal pre-pregnancy BMI and nutritional status in the first trimester of pregnancy were categorized into 2 (two) groups, normal nutritional status, if the mother's BMI was 18.5-25.0 kg/m^2 and not normal nutritional status or malnourished, if the mother's BMI was <18.5 kg/m^2 and > 25.0 kg/m^2.

Univariate and bivariate analysis were used to present the result of the study. The chi-square test was used to determine the association of maternal characteristics and pre-pregnancy nutritional status with nutritional status in the first trimester of pregnancy. The significant association was examined through a *p-value* less than 0.05 with a 95% confidence interval. The Ethics Committee of the Andalas University of Medical Faculty approved the study protocol and written informed consent was obtained from all respondents who signed the agreement before collecting the data. This research permit was issued by the Padang City Health Office with the letter number 891/4379/DKK/2022 issued on May 31, 2022. A research permit was issued by the Faculty of Medicine Andalas University with the letter number 945/UN.16.2/KEP-FK/2022.

Results and Discussion

The results showed that the average age of pregnant women was 29 years with the youngest being 21 years old and the oldest being 45 years old. For the frequency of pregnancies, this average was the second pregnancy, with the lowest frequency being 0 (it is the first pregnancy) and the highest indicating that this was the fifth pregnancy. For the results of the upper arm circumference, the average value was 28.9 cm with the smallest value of 19 cm and the largest being more than 31 cm (39 cm).

The value of pre-pregnancy BMI was 25 kg/m^2 with the smallest value being 14 kg/m^2 and the highest being 38 kg/m^2. The results can be seen in Table 1.

Table 1. Characteristics of Pregnant Women According To Average Age, Mid Upper Arm Circumference, and Pre-Pregnancy BMI (Body Mass Index)

Variable	Mean	+ SD	Min - Max
Age	29	+ 4.5	21 – 45
Frequency of Pregnancy	2.05	+ 1.2	0 – 5
Mid-upper arm circumference	28.9	+ 4.4	19 – 39
Pre-Pregnancy BMI	24.4	+ 5.5	14 – 38

(Primary data, 2023)

Table 2 below shows the results of the frequency distribution for each variable. This study showed that most of the respondents had high school education levels (45.5%), for the type of work, it showed that 70.5% of respondents did not work or as housewives. Based on the mothers' age category, most of the pregnant women were less than 35 years old (88.6%). There were two categories of frequency of pregnancy, most of the respondents had been pregnant less than 2 times (71.6%). According to the results of pre-pregnancy BMI, most of the respondents were overweight (39.8%).

Table 2. Frequency Distribution of Characteristics of Pregnant Women According to Mothers' Education Level, Mothers' Occupation, Mothers' Age Category, Frequency of Pregnancy, and Pre-Pregnancy BMI.

Category	Freq	Percent (%)
Mothers Education Level		
Completed Elementary School	3	3.4
Completed Middle School	5	5.7
Completed High School	40	45.5
Finished College	40	45.5
Mothers Occupation		
Housewife	62	70.5
Civil Servant/Private Employees	12	13.6
Self-Employed	4	4.5
Others	10	11.4
Mothers Age Category		
≤35 years	78	88.6
>35 years	10	11.4
Frequency of Pregnancy		
0-2	63	71.6
>2	25	28.4
Pre-Pregnancy BMI		
Underweight	8	9.1
Normal	45	51.1
Overweight	35	39.8

(Primary data, 2023)

The results of the present study showed four characteristics were predictors for the nutritional status of pregnant women, including the mother's education level, mother's

Table 3. The Correlation between the Characteristics of Pregnant Women, Pre-Pregnancy BMI, and Nutritional Status

Variable	Nutritional Status						P-value
	Normal		Malnourished		Total		
	n	%	n	%	n	%	
Mother Education Level							
High	48	60	32	40	80	100	1.000
Low	5	62.5	3	37.5	8	100	
Mother Occupation							
Work	27	43.5	35	56.5	62	100	0.264
No work	8	30.8	18	69.2	26	100	
Mother Age Category							
≤35 years	62	74.7	21	25.3	83	100	0.072
>35 years	2	40	2	40	5	100	
Frequency of Pregnancy							
Nulliparous	24	38.1	39	61.9	63	100	0.610
Primiparous	11	44	14	56	25	100	
Pre-Pregnancy BMI							
Normal	33	71.8	13	28.2	46	100	0.000
Malnourished	2	4.8	40	95.2	42	100	

(Primary data, 2023)

occupation, frequency of pregnancy, and BMI Pre-Pregnancy. Table 3 below shows the relationship of variables with nutritional status during pregnancy. The mother's education level was divided into two, high level (completed high school and college) and low education level (completed elementary and junior high school). The results showed that the majority of mothers with higher education were malnourished (40%) and pregnant women with low education levels had normal nutritional status (60%). The type of mother education, there were working mothers (civil servants/private employees) and housewives. Both of type education, the proportion of nutritional status of housewives had the proportion of nutritional status (56.5%).

The category of mother's age showed that 50 percent of respondents were malnourished by both categories (≤35 years and > 35 years). For the frequency of pregnancy, the pregnant women who had been pregnant 0-2 times, most of the respondents were malnourished (61.9%) and the frequency of more than twice were 56% normal nutritional status. There was no significant association between the mother's education level, mother occupation, frequency of pregnancy with nutritional status during pregnancy (Table 3). Mother's education level affects the mother's knowledge and how to access information related to health and nutrition (Handayani *et al.,* 2017). Mothers with better levels of education tend to have better knowledge and ability to apply better knowledge than mothers with lower levels of education. A good level of education can also lead to better job opportunities, a better socio-economic situation, and good food choices in preparing for pregnancy and during pregnancy. This can have an impact on the health status and nutritional status of the mother during pregnancy (Philippou *et al.,* 2017; Sun *et al.,* 2020; Permatasari *et al.,* 2021).

A mother's occupation can affect her nutritional status. Working mothers have sufficient income to meet nutritional adequacy. For working mothers, the food consumed was not always prepared from home, usually bought food outside. For this reason, it was necessary to pay attention to the food to be consumed must be healthy and nutritious and meet the nutritional

requirements of pregnant women. In mothers who do not work, the opportunity to eat food from home is greater. So that mothers could ensure that the food consumed was healthy and that cleanliness was maintained. Both working and non-working mothers must pay attention to food intake by consuming foods that follow balanced nutrition and appropriate portions.

The ideal age of the mother during pregnancy is in the range of 20-35 years. Mothers who are pregnant over the age of 35 years can be referred to as high-risk pregnant women. If the pregnant woman is too young, according to the literature, it states the unpreparedness of the reproductive organs and mental readiness as a prospective mother. If the pregnancy is too old, over the age of 35 years, there is a risk of pregnancy complications such as bleeding, anemia, Chronic Energy Deficiency (CED), and labor complications that have an impact on the child being born. The risk of genetic defects increases after the age of forty.

Pregnant women are a vulnerable group whose health and nutritional status must be considered to prepare for a healthy pregnancy and good pregnancy outcomes. Measurement of nutritional status through anthropometry before pregnancy is very important to determine the nutritional status of pregnant women and to prevent unexpected health problems during pregnancy (Mahanta, 2015; Li, 2013). The problem of malnutrition or (malnourished and overweight) pre-pregnancy and during pregnancy can increase the risk of pregnancy outcomes (Gondwe *et al.*, 2018; Yang *et al.,* 2021).

Of the pregnant women who were malnourished pre-pregnancy, there were 95.2% as malnourished pregnant women. The results of statistical tests showed that there was a significant relationship between nutritional status before pregnancy and during pregnancy (*p-value* = 0.000). Several studies state that assessment of nutritional status through anthropometric measurements such as maternal weight and height, and maternal upper arm circumference before pregnancy are important predictors of maternal weight gain during pregnancy. The nutritional status of pregnant women before and during pregnancy affects the condition of pregnancy and the weight of

the newborn (Xiao *et al.*, 2017; Bhowmik *et al.*, 2019). This is to prevent complications from pregnancy and children with LBW (Kuan *et al.*, 2017; Bonakdar *et al.*, 2019). Pre-pregnancy BMI is an important factor for assessing the conditions of a healthy pregnancy and as an assessment or risk assessment of pregnancy, especially related to weight gain which will have an impact on identification when women are at risk of having difficulty conceiving due to excessive or insufficient weight gain (Aji *et al.*, 2022; Ciptaningtyas *et al.,* 2022). For this reason, it is very important to monitor the nutritional status of the mother from before pregnancy until the end of pregnancy to ensure that the mother and fetus are in good health (Mahanta *et al.*, 2015; Kisworo *et al.*, 2021).

In this study, there was a significant association between BMI Pre-Pregnancy and nutritional status during pregnancy. Maternal and undernourished children account for more than one-third of all deaths among children. Moreover, it has been reported that proper nutrition before and during pregnancy is of high importance for health outcomes in the later life of both mothers and children. It is proposed that to promote the long-term health of both the mother and her child, following a healthy diet before and during pregnancy is crucial (Bonakdar *et al.*, 2019; Nugroho *et al.*, 2023). Both maternal anthropometry and weight gain during pregnancy are important determinants of birth weight (Soltani *et al.*, 2017; Jiménez, 2019; Meutia & Yulianti, 2019).

Inadequate prenatal weight gain was associated with an increased risk of intrauterine growth retardation, preterm delivery, low birth weight in infants, and increased perinatal mortality, whereas overweight, obesity, and excessive weight gain may also be at risk in mother and pregnancy outcomes. Maternal weight gain during pregnancy could affect the relationship between BMI before pregnancy and pregnancy outcome. Women with less pre-pregnancy BMI who experienced enough gestational weight gain potentially delivered babies with normal or near-normal weight. Good gestational weight gain might compensate for the adverse effects on fetal growth associated with low maternal BMI during early pregnancy.

Conclusion

Pre-pregnancy BMI is a factor in a healthy pregnancy and identifies when women are at risk of a difficult pregnancy due to excessive or insufficient weight gain. Underweight and overweight during the preconception period may directly affect maternal health development and adverse pregnancy outcomes such as preterm birth. Maternal weight gain during pregnancy can be an indicator to assess maternal nutritional status and predict pregnancy outcomes. Suggestions for pregnant women were to know their nutritional status, consume nutritious foods that were needed for fetal growth, and reduce the risk of low birth weight and the risk of other stunting triggers. A healthy pregnancy will determine the child's future by optimizing the first 1000-day period that begins from the time of the womb.

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